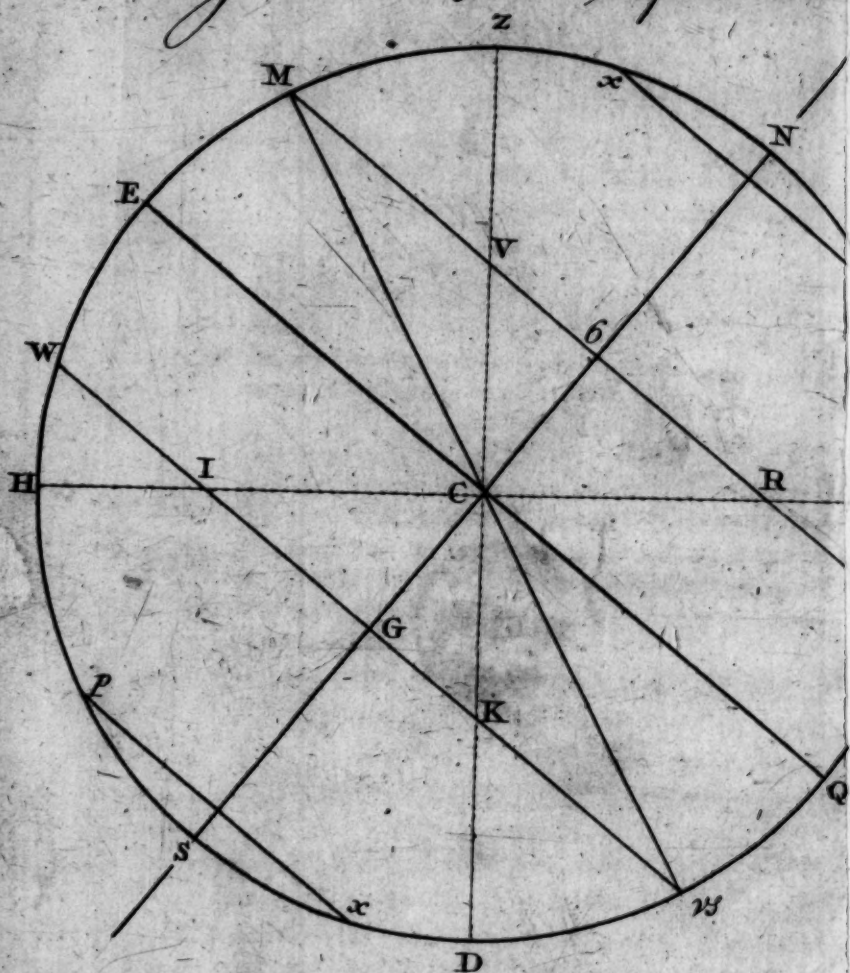


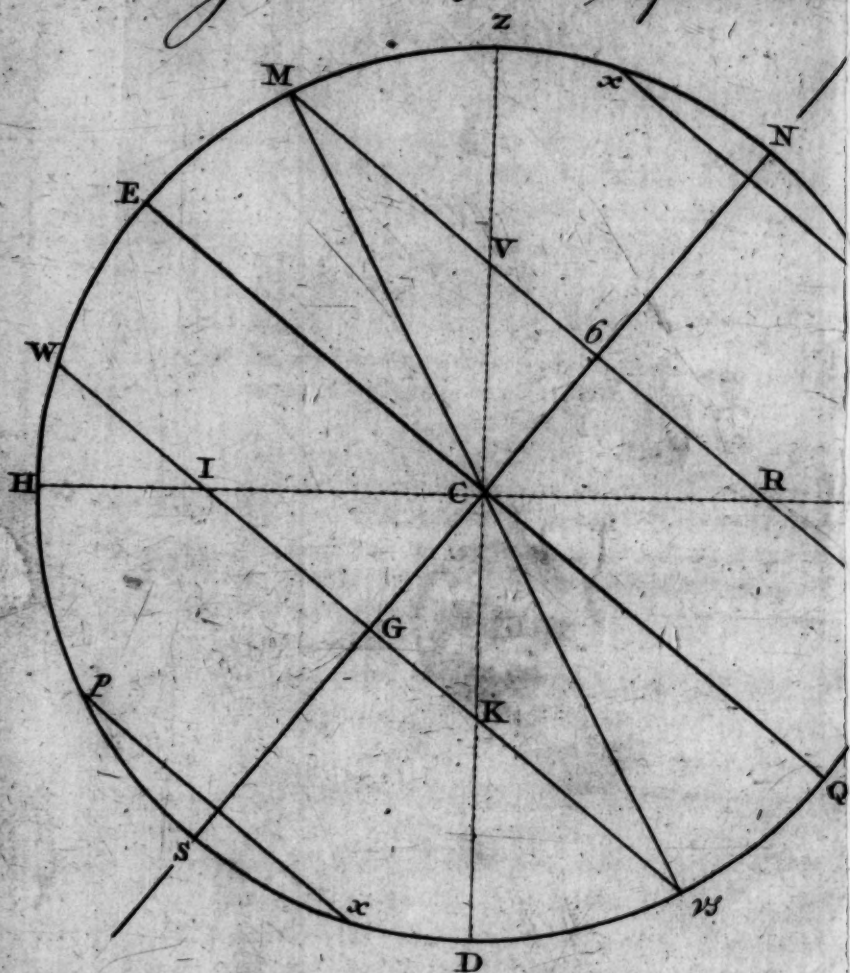
Projection of the Sphere



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ASTRONOMICAL
C A T E C H I S M,

FOR THE 3562 and 18

INSTRUCTION

AND

ENTERTAINMENT

OF

YOUNG GENTLEMEN AND LADIES.

BY A MINISTER IN THE COUNTRY FOR THE USE OF HIS OWN
CHILDREN.

Come forth, O Man, yon azure Round survey,
And view those Lamps, which yield eternal Day:
Bring forth thy Glasses; clear thy wond'ring Eyes;
Millions beyond the former Millions rise:
Look farther--Millions more blaze from remoter Skies.

THE UNIVERSE, A POEM.

Why dost thou wonder, O Man, at the Height of the Stars?
examine thine own Soul rather, and wonder there.

ISIDOR.

L O N D O N:

Printed and Sold by T. WILKINS, No. 23, Aldermanbury.
Sold also by H. D. SYMONDS, and J. Bzw, Paternoster-Row; J.
MURRAY, Fleet-Street; W. RICHARDSON, Royal
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Mr. VET, Ringwood.

1792.

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ADVERTISEMENT.

THE reader will easily perceive by the mode and style of this little tract, that it was drawn up only for the use of CHILDREN, to form a useful and pleasing addition to a variety of their amusements in their play-hours; I hope to allure them to the love and use of it, by expatiating upon the questions as they repeat them, and also by that *great* reward a halfpenny, or a halfpenny worth of what the season produces; or propose a necessary garment, as a reward—These will go a great way with young minds.

It is therefore hoped that the judicious, in this science, will overlook the inaccuracies and other defects which they certainly will meet with; nevertheless, I shall esteem it a favour, if they will inform the printer by letter, of any material errors, with the corrections of them.

The reader, is desired to correct the following errors;

ERRATA.

Page 2 line 6, for Pathegorean, read Pythagorean. p. 4 l. 8. for neverceme, r. never come—bottom line, for vigorate, r. invigorate. p. 8. l. 3. for more; r. greater. p. 3, l. 26. for stud, r. thought. p. 8. l. 25. for Equatral, r. Equatrol. p. 28. l. 9. for has, r. have.



THE
AUTHOR'S ADDRESS
TO HIS
CHILDREN.

My DEAR CHILDREN,

IT is my wish that your amusements should be of that pleasing and rational nature, which will bear reflection in future years; and as your ideas expand, they may assist in properly forming your judgment, respecting men and things, and the wonderful works of God.

Contracted ideas are the sure offspring of little minds; which having been cramped in narrow spheres, and shackled with a partial education, are only a small remove from barbarous rudeness, which is unpardonable in this age; especially in those who have been brought up in the smallest degree above the vulgar.

Should you prove pedantic, or for a moment indulge the vain thought of your superiority over any of your acquaintance, who have not had the advantage which you have, by a scrap of knowledge which you may acquire from the few following questions—my views in presenting you with them will be frustrated.—I intended by this small view of the wondrous works of God, to impress your young minds with a just sense of your Maker and Preserver, whose care and power is equally concerned in your preservation, as in the order and management of all those vast bodies which are continually rolling along their rapid courses.

It was that your ignorance of that great God, his surprising works of nature, and his wisdom of providence, to which you cannot fully attain, might humble you in profound adoration before him. For who by searching can find out God? who can know the Almighty to perfection? But the experimental knowledge of the great work of redemption by JESUS CHRIST, is infinitely superior to all other kinds or degrees of knowledge attainable in this life. What is comparable to the love of CHRIST manifested in

the redemption of lost sinners here, and that "eternal weight of glory," which awaits them in the world to come?

"'Twas great to make those worlds from nought;

"But 'twas greater to redeem."

My present views, respecting this tract, can rise little higher than your learning the outlines of this noble science—this is an amusing exercise, and even in this I have an end to answer, to keep you out of the streets, from the company of the rude and wicked of your own age, and which I hope to allure you to with fair means and small rewards: but I expect as your young minds expand, in contemplating those mighty worlds above, you will say in the spirit in which the following lines were wrote:

"When I behold thy works on high,

The moon that rules the night,

And stars that well adorn the sky,

Those moving worlds of light,

Lord, what is Man, or all his race,

Who dwells so far below,

That thou should'st visit him with grace,

And love his nature so?"

May your contemplation of the following questions, in future years, have the same happy effect upon your minds, which they had upon your father, while arranging them in the order in which they now stand;—should it please God to make you wiser and better; and useful members to civil and religious society by this, my end is answered. And should providence so order it, that any of you should live to have families of your own, I have left you some small helps for your assistance, in forming your minds to piety: for all those small tracts, which I have published, were with an eye to you, as well as for the different ends for which they were then intended.

The All-wise God sees it right in infinite wisdom, that I shall have nothing of this world's goods of any kind, to leave to you, not even a liberal education; however, I hope you will have a *pious* one—This, with principles of integrity and becoming modesty, with a bible in your hand

hand and your father's prayers, you are to launch into the world. Nor indeed am I anxious for your temporals; the great Parent of the universe, who gave you to me, has wonderfully taken care of, and amazingly provided food, raiment and friends for you, from known and unknown quarters. I mention this that you may be humble, that you may cultivate a suitable deportment to all; for you know not all your benefactors, altho' they may know you. I wish you to be happy in yourselves, and with one another, and with all among whom your lot may be cast; but let me tell you, this can only be attained in the sublime enjoyments of true religion; and then it will be absolutely necessary for you to watch over your *conduct*, your *company*, and your *heart*, and I would advise and charge you to be-ware of rigid and contracted sentiments in religion, be-ware of condemning or censuring other parties, denominations, modes and forms, which differ from yours; for if there were no sin in such conduct and temper, supposing it had no tendency to rent churches, divide families, sow discord amongst neighbours; that unhappy spirit is capable of making you the most contemptible beings in nature, to men of sense and real religion.—I hope you will retain those religious principles in which you have been brought up. But first try and prove them, by the word of GOD and prayer, for your satisfaction; and not because I have adopted them. Let clear conviction and conscience determine your choice in all things, but especially in matters of religion; because you yourselves, and not another, are to answer before GOD in matters of a spiritual nature.

That in this and all things you may be instructed of GOD, preserved from wicked dispositions, principles and connections—that you may be the objects of heaven's peculiar care—a blessing to all your future connections, and an ornament to religion, is and ever shall be the fervent prayer of your affectionate FATHER

J. D.

June 30, 1792.

ON THE
SOLAR SYSTEM.

THE Sun revolving on its axis turns,
And with creative fire intensely burns:
Impell'd the forcive air, our earth supreme,
Rolls with the planets round the solar gleam;
First Mercury completes his transient year,
Glaring, refulgent, but not always clear.
Bright Venus occupies a wider way,
The early harbinger of night and day.
More distant still our globe terraqueous turns,
Nor chills intense, nor fiercely heated burns.
Around her rolls the lunar orb of light,
Drawing her silver glories thro' the night;
On the earth's orbit see the various signs,
Mark when the Sun, our year completing shines.
First the bright Ram his languid ray improves,
Next glaring, wat'ry, thro' the Bull he moves.
The am'rous Twins admit his genial ray,
Now burning thro' the Crab, he takes his way.
The Lyon, foaming, bears the solar power,
The Virgin faints beneath the sultry shower:
Now the just balance weighs his equal force,
The slimy Serpent swelters in his course.
The sabled Archer clouds his languid face,
The Goat with tempest verges on his race
Now in the water, his faint beams appear,
And the cold Fishes end the circling year.
Beyond our globe, the sanguine Mars displays
A strong reflection of primæval rays.
Next bloated Jupiter, far distant gleams,
Scarcely enlighten'd with the solar beams.
With four unfix'd receptacles of light,
He tours majestic thro' the spacious height;
But farther yet the tardy Saturn lags,
And five attendant luminaries drags;
Investing with a double ring his pace,
The circles thro' immensity of space.

A N

ASTRONOMICAL CATECHISM.

Q. **W**HAT is Astronomy?

A. The Study of the heavenly Bodies, their proper Places, Motion and Use.

Q. How many Systems have there been acknowledged in Astronomy?

A. Three.

Q. Which is the First?

A. The Ptolomean, invented by Ptolomy the Egyptian*. He thought the Earth was the Center of the Universe, and immoveable.

B

Q. Which

* The Chaldeans and the Egyptians were the most remarkable and ancient Astronomers. The former gloried in Zoroastes, who taught this 900 Years before the Destruction of Troy. And the Latter in their grand College, where Astronomy was taught on the famous Monument of Osymandyas, where was a golden Circle of 365 Cubits Circumference, and 1 Cubit thick. The upper Face was divided into 365 equal Parts, and on each, the Name of the

Q. Which is the Second?

A. The Tychonic, invented by Tycho a Dane. He thought the Earth was the Center of the Firmament, and the Sun the Center of the Planets

Q. Which is the Third?

A. The Pathegorean-Copernican or Solar, which is now become the uncontroverted System, amongst all Astronomers, for these last 300 Years.

Q. According to this System, where is the Sun's Place?

A. In the Center of the planetary Worlds.

Q. What are the Names of the Planets?

A. Mercury ♀; Venus ♀; the Earth ☉; the Moon ☾; Mars ♂; Jupiter ♃; Saturn ♄; and the Georgium Sidus X.

Q. Which move round the Sun or Planets?

A. The Planets move round the Sun, in different Circles.

Q. Has the Sun any Motion at all?

A. The Sun turns round his Axis in 25 Days and 6 Hours, from West to East, at the Rate of 4262 Miles an Hour.

Q. Why should the Sun turn round, seeing he is the Fountain of Light, and can have neither Day nor Night?

A. First, that his dark Spots may not be too long facing any of the Planets, and so give his Light equal

the Days of the Year, with the rising of the Stars on each Day by the Year, with Prognostications. When Alexander took Babylon, he carried away Observations for 3000 Years, which were engraven on Bricks.

CATECHISM.

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equal to all. And Secondly, that he may obtain a centrifugal Force, sufficient to counterbalance the different Attractions of the Planets, and without which, the Earth's Attraction would pull him out of his Place.

Q. Why does the Sun move in a less Orbit than the Earth, seeing he performs his Revolution in the same Time?

A. Because he moves slower in Proportion to his Matter, it being 200,000 Times greater than our Earth, and of Course he attracts the Earth 200,000 Times more than the Earth attracts him.

Q. Is the Sun much larger than the Earth*?

A. The Sun is in Thickness 793,000 Miles, and his Diameter is equal to 100 Diameters of our Earth. His Surface is equal to 10,000 Times the Surface of the Earth; his Solidity is a Million Times greater than the Earth!

Q. What is the Sun's Diameter?

A. 893,760 Miles.

Q. What are the Materials of the Sun, has he any Atmosphere?

A. Of the same Nature with the other material Parts of this Universe; his Atmosphere is large, close and compact.

What is the Matter with you, S—h, you seem to be in a profound Stud?

I am, Papa; at the Glory of that unspeakably great Fountain of Light: more so, as I remember last Sabbath, in the Afternoon Sermon, you said, that every Creature which God made, was for the Use of Man.

B 2

But,

* He is an Hundred Million of Miles larger than the Earth, Willer upon Gen. from Plutarch de placites Philosophorum.

But what will you think, when I tell you, that in Heaven you shall be much more glorious than that Sun—Don't you remember what I read to you, respecting the Sun, Yesterday, in Dr. Hunter's Sermon on the universal and eternal Dominion of God, which he sent me by Mr. F. "Awake, arise, O my Soul, and tell that awful Planet, "that he, like me, had a Beginning, but that I like him "shall never come to an End: he saw me the Hour of my "Birth, and I shall behold the fatal Period of his Dissolution." Read the whole of this most sublime Meditation.

Q. What Benefit do we receive from the Sun?

A. By his Warmth and Heat, he promotes Vegetation, cherishes animal Life, and raises Vapours from the Sea; without which, we could have no Rain.

Q. What is the Nature and Quality of Light?

A. It is the innumerable Rays from the Sun, spreading themselves with inconceivable Velocity through the Ether: it is unspeakably subtil, penetrating thro' Glass, and through the whole Universe.

Q. As these Rays of Light come from that Globe of Fire the Sun, do they partake the Nature of Fire?

A. They do; and to prove it, hold a Glass in a right Direction to the Sun, it will collect the Rays, and at a Focus Distance on the reverse Side will set Things on Fire.

Prodigious Orb! bright Source of vital Heat, and Spring of Day—soft Flame, yet how intense, how active! how diffusive, and how vast a Substance; yet how collected thus within itself, and in a glowing Mass confined to the Center of the Planetary World. Mighty Being! brightest Image and Representative of the Almighty! Supreme of the corporeal World! of undecaying Youth! fair, beautiful, and hardly mortal Creature! by what secret Ways dost thou receive the Supplies to maintain thee still in such unwearied Vigour, and unexhausted Glory, notwithstanding those eternally emitted Streams, and that Expence of vital Treasures which enlighten and vivorate the surrounding Worlds.

Earl of Shaftsbury.

CATECHISM.

M E R C U R Y.

Q. Which of the Planets move first round the Sun?

A. Mercury, which he performs in 87 Days and 23 Hours; he is distant from the Sun 36,000,000 Miles, his Diameter 3100 Miles, and moves at the Rate of 109,699 Miles an Hour, which is almost as fast again as the Earth travels: being so near the Sun that he is seldom seen but by Astronomers; his Heat and Light is seven Times greater than ours, in the hottest Day in Summer, sufficient to make Water boil. His Orbit is within ours, and so is that of Venus; and of Course he must come between us and the Sun at Times; and when he does, he appears as a little black Spot on the Sun, which by a good Glass may easily be seen.

Q. What Appearance has Venus and the Earth at Mercury?

A. Seven times as large and bright as Venus does to us.

VENUS.

Q. Which is the next Planet that moves round the Sun?

A. Venus, which she performs in 224 Days 17 Hours; her Distance from the Sun is, 68,000,000 Miles, and moves at the Rate of 80,295 Miles an Hour: her Diameter is 9360 Miles—turns round her own Axis in 24 Days and 8 Hours. Her Light and Heat is twice as great as ours. She is the most brilliant and largest in Appearance of any in the Heavens, frequently shewing herself in the Day Time; is 40 Times as large as our Earth—She is in Colour white; when she is between the Sun and us, she is the Morning Star; but when she is in the opposite Part

AN ASTRONOMICAL

of her Orbit, she becomes our Evening Star. Venus twinkles a little; Mercury, though very small, much more—by their nearness to the Sun; but nothing near so great as that of the fixed Stars.

EARTH.

Q. What Planet moves next round the Sun?

A. The Earth, which Revolution she performs in 365 Days and 6 Hours, at the Rate of 68,243 Miles every Hour: she turns daily round her Axis every 24 Hours, at the Rate of 580 Miles an Hour; just like a Boy's Top when it spins. Its Orbit is in Diameter, 190 Millions of Miles.

M—va. Pray, Papa, let me ask you one Question here, else I shall forget it.

What is it my Dear?

Are we carried 68,243 Miles every Hour?

Martha. Sister, that is but one Part of the Earth's Motion, have you forgot the 580 Miles an Hour of her other Motion?

M—va. O yes, you are right, Sister, that is in all 68,823 Miles? Yes, my Dear, you are, and yet you perceive it not—This is the mighty Work of God, and you yourself shall mount with much more Speed than that one Day.

Pray when, and where, Papa?

At the Moment of your Death, if you die in Christ; when you shall instantly be wafted thro' those glorious Worlds, to the eternal Temple of the everlasting God.

Q. Well, Papa, I am amazed—but seeing this Globe moves so rapidly, how is it that the smaller Parts of the Earth do not fall to Pieces; that the Sand, Stones, Buildings, and living Creatures do not fall

CATECHISM.

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fall off; that the Sea, Lakes, and Rivers, do not fall out of their Channels?

A. The Gravity (or attracting) Power of the Earth exceeds its centrifugal Force 288 Times; therefore not one Atom can fall off by its Motion*.

Q. To what Quarter does the Earth turn in her diurnal Motion?

A. To the East, and for this Reason, we think that the Sun, Moon, and all the heavenly Bodies turn to the West.

Q. What Benefit is the Earth's diurnal Motion to us?

A. It is the Cause of Day and Night, throughout the World, at different Times: Were it not for this Motion, one half of the Earth would lay six Months in frigid Cold, and extreme Darknefs; while the other Half would be scorched with intense Heat; and wearied out with the continued Glare of Light.

Q. How is the Earth supported?

A. It is Pendant, and hangs as it were in the Air, without any visible Cause to support it from above; or, uphold it from beneath.

Q. Does she move regularly and invariably the same?

A. Yes, although her annual Race is at the Rate of one Million and one half Miles a Day.

Q. When was the Earth proved to be round?

A. In 1519, by Magellan, who sailed from a Port

B 4

in

* To illustrate this, take a Pail full of Water, run round with it in your Hand stretched out; and not one Drop of it can fall off.

in Europe, keeping one straight Direction, and returned to the very same Port again.

Q. How much more Quantity of Matter has the Sun than the Earth?

A. 200,000 Times, and just so much more does he strongly attract the Earth; but his Motion being so much in Proportion to that, slower than the Earth, gives an equal Ballance to them both.

Q. What State is that Point in, which forms the Center of Gravity, between the Sun and the Earth?

A. At perfect Rest.

Q. Is the Sun's Attraction at each particular Planet, equal to the centrifugal Force of each Planet?

A. Yes, and by that Means, the Planets are all retained in their respective Orbits. This is what is called, the great Balance of Nature.

Q. Does any Part of our Earth move faster than another?

A. At the Equator, it moves faster than we do in Britain, because we are so near the motionless Pole.

Q. What do you mean by the Equator?

A. The Middle, between the Poles, and always is cut in Halves, by the boundary of Light and Darkeness.

Q. Whether is the Equatral, or Polar Diameter of the Earth greatest?

A. The Equatorial Girth of the Earth is 25,000 Miles; and 35 Miles larger than the Polar Diameter.

Papa, I wish I had such a large Hoop that would go round this World.

Give

CATECHISM.

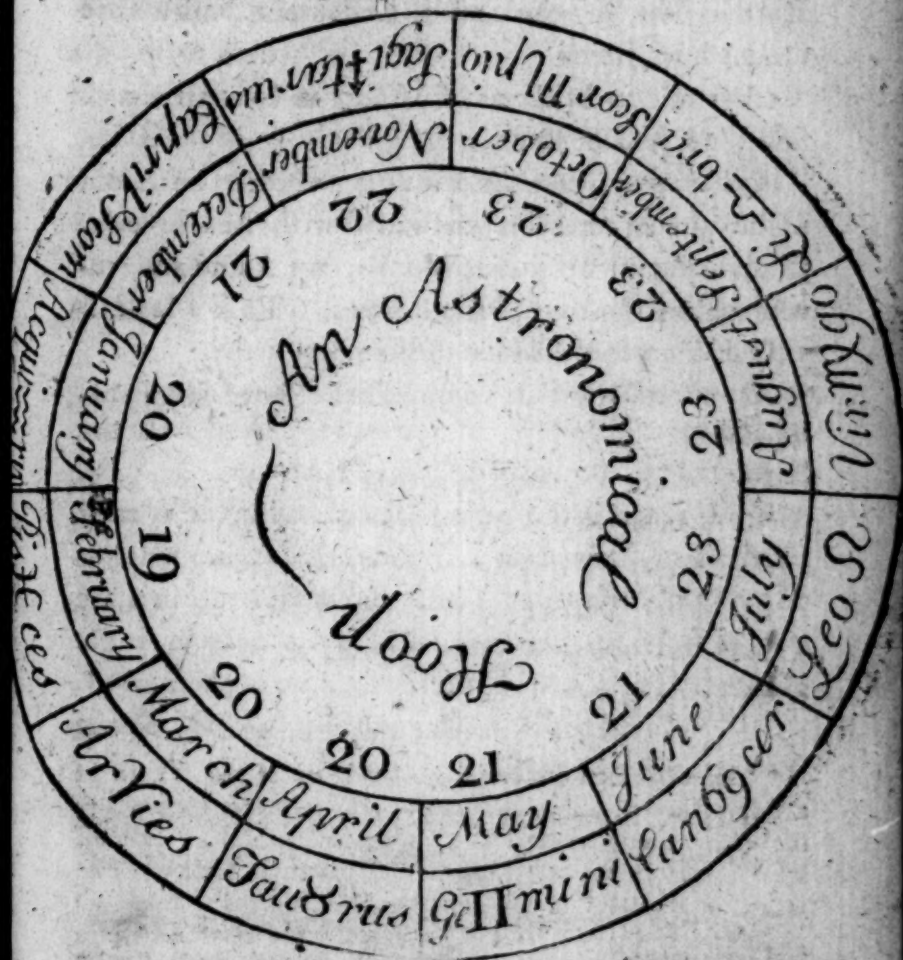
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Give me your Hoop, J—n, and I will endeavour to make it fit the World.

That will be a little World indeed, Papa, I mean such a World as you have been talking of.

I mean such a World too, J—n, but you must learn all these Months, Signs, and Figures; and when the Sun enters into them; so you will know where the Sun is every Month in the Year; and then you can tell me by your Hoop, where he is, or on these Globes.

Yes, Papa, that I gladly will.



Q. What is the Position of the Earth on the 21st of June, the longest Day?

A. The

B 5

A. The Sun will point $23\frac{1}{2}$ Degrees North of the North Pole; and on December the 21st, the Shortest Day, the Sun points North from the Equator $23\frac{1}{2}$ Degrees; and on the 20th of March, the Earth's Axis inclines no where, but is side-ways with the Sun; and he is directly over the Equator.

Q. How much nearer are we to the Northern Parts of the Sky the 21st of December than we are the 24th of June?

A. 190,000 Millions of Miles, and yet we don't find the least Difference in the magnitude of the Stars. This shews us, that the Earth is only like an Atom in the Sun-Beam, when compared with the Universe. O thou Parent of these Worlds, we adore and reverence thy glorious Name! Lord, what is Man?

Q. What is the Diameter of the Earth?

A. 7970 Miles, and is the first Planet that is attended by a Moon or Satellite and is distant from the Sun. 95,173,000 Miles.

Q. Whether is there most Sea, or Land in the World?

A. The Seas and unknown Land, amount to 160,522,026 square Miles, the inhabited Parts are 199,512,595 square Miles. These put together, is the Number of square Miles on the Surface of the Globe*.

Q. What

* Many Things concur to persuade us of the Truth of a Conjecture of Sir I. Newton's, viz. that the Proportion of Water in our terraqueous Globe, lessens daily. Almost all the Seas in the World recede from their Banks. The Coasts of England do daily encroach on the Sea. The Sea-ports of the Ottoman Empire fill gradually more and more with Sand, and the Sea removes from them: Egypt was formerly but a Morass, but it has visibly risen of late Years,

Q. What is the Ecliptic?

A. It is the serpentine Line round the Globe, which shews the Sun's Path through the Stars, or rather the Earth's Motion in the Plane of such a Line.

Q. What is the Horizon?

A. That great Circle, which is equally distant from the Zenith and Nadir of any Place, and which divides the Sphere into the upper and lower Hemisphere.

Q. What is the Nadir?

A. The Point of the Sphere directly under us.

Q. What is the Zenith?

A. The Point of the Heavens directly over us.

Q. What is the Latitude of any Place on Earth?

A. The Latitude of a Place, is the Number of Degrees, which that Place is from the Equator; whether on the North or South Side of it.

Q. What is understood by the Longitude of any Place on Earth?

A. It is an Arch of the Equator, contained between the Meridian of that Place, and the Meridian of the Place, which is chosen for the first, where the reckoning of Longitude begins.

OF THE MOON.

Q. Which Planet next moves round the Sun?

A. The Moon, which though she looks the largest, is the very smallest of all the heavenly Bodies; she moves round the Sun, in the same Circle with the Earth, and in the same Time.

Q. Has the Moon any other Motion?

A. Yes, her diurnal Motion round the Earth is in 29 Days and 12 Hours, (which Period makes only 1 Day and 1 Night) at the Rate of 2290 Miles an Hour.

Q. Whether is the Summer half Year, or the Winter half Year longest?

A. The Winter half Year begins September the 12th, and finishes it on March the 10th, which is shorter than the Summer by seven or eight Days.

Q. What Distance is she from the Earth?

A. 240,000 Miles, and is 2175 Miles in Diameter, and 50 Times less than the Earth. Her Surface contains 14 Million of square Miles.

Q. Has the Moon any Atmosphere round her?

A. Yes, but such as is not attended either with Clouds, Rain, Hail, nor Snow; and of Course different from ours, else we could not always discern the Moon's Face; without, as well as with a Telescope. The full Moon is a fine View in a clear Night, through a good Glass*; but the Mountains, &c. are best discovered when in her second or third Quarter.

Q. See-

* The largest and best Glass we ever heard of, is that of Dr. Herschell's, just finished; it is forty-five Feet in length, and upwards of five Feet in Diameter; great Discoveries in the heavenly Bodies are expected by Means of this grand Instrument. Mr. James Gregory, Professor of Mathematics in Edinburgh, invented the reflecting Telescope in 1663, before he was 24 Years of Age: he was Grandfather to the late John Gregory, M.D. whose Name and Family I shall ever respect, he being once the Instrument of saving my Life, while he was Professor of Medicine at the University of Aberdeen. Mr. David Gregory, Nephew to Mr. James Gregory, invented the compounding Object Glass, of the refracting Telescope,

CATECHISM.

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Q. Seeing the Earth moves at such a prodigious Rate in her Orbit round the Sun, how is it that the Moon is not left behind?

A. Because the Moon is within the Sphere of the Earth's Attraction, and therefore must follow the Earth, let her Motion be what it may *.

Q. How many Times would it take round the Earth, to go round the Moon's Orbit?

A. Sixty Times, therefore every Degree of the Moon's Orbit is equal to 60 Degrees (or 4155 Miles) on the Earth's Surface.

Q. How much larger is the Surface of the Earth than the full Moon?

A. Just thirteen Times, when the Earth is full to the Moon; and her Inhabitants behold the Earth, just thirteen Times larger than we do the Moon: and they have thirteen Times the Light from our Earth, that we have from the Moon.

Q. Do the Earth and Moon move round the common Center of Gravity between them both?

A. Yes, every Month.

Q. Suppose there were no Moon, would that Center of Gravity, describe the Orbit in which the Earth would move round the Sun in a Year?

A. Yes.

Q. How many Miles is it from the Center of the Earth to the common Center of Gravity between the Earth and the Moon?

the

* For instance, whirl a Sling with a Pebble in it, round your Head; it will move the same, whether you stand, run, or walk.

A. 6000 Miles; for the Earth has 49 Times the Quantity of Matter that the Moon has: the Distance of the Moon from the Earth is 240,000 Miles, which if divided by 40, the Remainder will be 6000.

Q. How long may an Eclipse of the Sun continue total with us?

A. Never above four Minutes and a half, because the Moon's Distance is little more than a 396th Part of the Sun's Distance from it.

Well, Papa, I think Astronomy and Divinity quite contradict each other; and except you can reconcile them, I shall have but little to say to Astronomy.

Well M—va, wherein do they oppose each other?

I remember once, in a preparation Sermon, you mentioned something of that Darkness which took Place at Christ's Crucifixion—I looked into St. Mark's Gospel, and found it continued three Hours; now you make it appear upon the Principles of Astronomy, that no total Eclipse can continue above four Minutes and a half.

That Eclipse, M—va, was not natural, but a supernatural one.

Papa, I wish to have some Reasons clearly assigned for that wonderful Event.

My Dear, you shall have all the Proof that I can give you; observe, Christ was crucified on the Day of the full Moon, the Moon was then opposite to the Sun, when it was impossible in Nature, that any Part of the Sun should be hid from the Earth.

Papa, can you prove that it was at the full Moon when Christ suffered?

Yes, for the Passover was always kept at the full Moon, and the Crucifixion was at that Season; therefore that Eclipse was an immediate Act of the supernatural Power of God; and possibly to confound the wise Men of those Days; especially those of his Murderers, and to strengthen the

the Faith of his Disciples and the Unprejudiced; by God's thus shewing his Displeasure at those Men who were the Crucifiers of the Lord of Glory.
Now Papa, I am satisfied, let us go on.

Q. Is the Moon's Distance from the Earth always the same?

A. No, her Orbit is elliptical, and so has two Centers; And 240,000 Miles is the Middle between the least and greatest Distance.

Q. How many Miles nearer the Earth is the Moon at her Access, than she is at her Recess?

A. 3400 Miles.

Q. What Service is the Moon to us?

A. She rules and illuminates our Nights; she purges the Seas, she forms and regulates the Tides; she has also much Influence on many Things in our World, both animate and inanimate.

Q. What is the Cause of the Moon's being eclipsed?

A. The Earth's passing in her Orbit between the Moon and the Sun; and this proves the Earth to be a dark Body.

Q. What is the Cause of the Sun's Eclipses?

A. The Moon's passing between the Sun and the Earth, which also proves that the Moon is a dark Body; for if the Earth and Moon were light Bodies in themselves, there could be no Eclipses.

Q. What Use is our Earth to the Moon?

A. The Earth reflects Light to the Moon, when with her the Sun is set; just as the Moon does to us when our Night comes on, so that whatever
Name

Name the Lunarians give our Earth, we may say that the Earth is a Moon to the Moon.

Q. How many full Moons would it take to be placed in a clear Sky, to give us Light equal to the Light of a Day, when the Sun does not shine forth?

A. 90,000, which Number would fill the whole Face of our Sky.

Q. Why do not we always see the Moon?

A. When she is on that Side of the Earth next the Sun, then the dark Side of the Moon is towards us; for this Reason, we cannot see her.

MARS.

Q. What Planet moves next round the Sun?

A. Mars, in 687 Days: distant from the Sun 123,000,000 Miles; his Diameter is 5150 Miles; he moves 55,287 Miles every Hour; he always appears in a reddish dusky Hue, and is the smallest of all the Planets, except Mercury: his diurnal Motion is in 24 Hours and 40 Minutes. His Inhabitants know no Difference between either Summer or Winter; his Light and Heat are near three Times weaker than ours in Winter, when the Sun does not shine out.

Well, Papa, I think the People who dwell in Mars, might as well live in the Northern Parts of Russia, or in Greenland, in the Month of December; we can hardly see to read here in those dark Days, and what a State must they be in?

You must know B——n, that God who loves all the Créatures which he has made, loves also to make

make them happy, therefore he no doubt, has so constructed their Bodies, as to be perfectly satisfied, both with the intense Cold and dark State in which they are in; even here we behold, something of the Power of Heat and Cold, and of God's tempering the Body to its Station and Employment; for do not you remember those two Boys who were here Yesterday, who being always accustomed to go bare Footed, said, "They never felt any Cold in their Feet," although it was a severe Season of Frost and Snow; God's great Wisdom is seen in adjusting the Structures and Habits of Mens Bodies, to the different Climes in which he places them.

But, Papa, could not God give them a Moon as well as we have? or does God love us better than he does them?

That is a Topic in Divinity, B——n, that I really cannot resolve; he could have given them a Moon, no Doubt; but, if God loves any of his Beings more than he does us, it must be amazing indeed; for God loved us with an everlasting and unchangeable Love, more than the Angels that fell; such is it, that the Angels in Heaven *ταπαινωσαι* *i. you remember that Word, we read it a few Evenings ago, 1 Pet. i. 12. from *ταπα*, to, for this Reason, and *κνυτω* to stoop down, or stretch themselves to look at something which is hid, or surprizing. Yes, Child, they now look, and long have looked with Desire into this mysterious Love of

* Peter borrows this Allusion from Exodus xxv. 18, 19, 20. where the Cherubims were made to look downward to the Mercy-Seat in the Holy of Holies. The same Word is used in John xx. 5. when the Disciples came to the Sepulchre where Jesus was laid.

of God to us, but they have not yet discovered the Depth thereof, nor will they to all Eternity. That is great, indeed, Papa, and I should think that our Negligence of God, and Ingratitude to him, might be said to be a greater Sin in God's Account, than the Sin of the fallen Angels.

That is a critical Point, B——n, but I think we may safely affirm on this Head, that God's Love and Mercy has been greater to fallen Men, than to fallen Angels.

JUPITER.

Q. What is the next Planet revolving round the Sun?

A. Jupiter, he is 94,100 Miles in Diameter, and 1000 Times larger than the Earth, and much larger than any of the other Planets, revolves round the Sun, in about 12 Years; he is distant from the Sun, 424,000,000 Miles, turns round his own Axis in 9 Hours and 56 Minutes; at the Rate of 38,159 Miles an Hour. His Light is 27 Times less than ours.

Q. How wide is the Diameter of Jupiter's Orbit?

A. It is indeed wonderful, being no less than 895,134,000 Miles.

Well Papa, these Persons are still in a worse Condition than those in Mars; are not these the People that it is somewhere said of them, that they sit in Darkness and the Region of the Shadow of Death?

No

No, 5——1, We in this Country, as well as those Heathens in Galilee, are the Persons there spoken of, upon whom the Light of the Gospel has shined; for we sat in Security, in a Darkness worse than Egyptian Darkness, and in a horrid Region of spiritual Death.

Q. But have they no other Lights?

A. Yes, he has 4 Moons, which goes round him at different Times, and at different Distances: the 1st, in 1 Day, 18 Hours and 36 Minutes: 2d, in 3 Days, 13 Hours and 13 Minutes: 3d, in 7 Days, 3 Hours and 59 Minutes: 4th, in 16 Days, 18 Hours and 30 Minutes.

None of these Moons are less than our Earth, and they reflect a strong vivid Light to the Inhabitants, which may be seen here, through a good Glass.

Q. Has Jupiter any Thing else remarkable?

A. He has a famous Spot, by which his Diurnal Motion was determined; also his famous Belts, of which sometimes 8 appears, and sometimes only 1.

SATURN.

Q. What Planet next moves round the Sun?

A. Saturn, in nearly 30 Years: Distant from the Sun 907,956,130 Miles; his Diameter is 77,990 Miles, and moves at the Rate of 22,101 Miles an Hour; he is 94 Times larger than our Earth.

Q. Is Saturn much farther from the Sun than the Earth and Jupiter?

A. He

A. He is 700 Million of Miles farther than the Earth, and 200 Million of Miles farther than Jupiter.

Q. How wide is the Horizontal Arch of Saturn?

A. 29,200 Miles. What an amazing Arch for his Inhabitants to behold! he has not above the 90th Part of our Light and Heat.

Papa, what a vast Difference is there between the Light and Heat of Saturn and Mercury? the One in great Darkneſs and Cold, the other involved in an unſupportable Blaze of Light.

True, E——th, but let us ſuppoſe the Pupils of their Eyes, who live in Saturn, to be 90 Times as large as ours, which they would be if they were but nine Times and a half the Diameter of ours; they would then receive in 90 Times the Light that we do; and ſo would be as Light as we are, and—What's the Matter Children?

Why, Papa, we cannot but ſmile, to think what Beauties they are who inhabit Saturn; if their Eyes be ſo large, ſure their Heads muſt be in Proportion; and if their Bodies be alſo proportioned, we may aſſert that Planet to be the Seat of Giants, and if not, there muſt be a vaſt Diſproportion between the Head, Body, and Eyes.

How, that may be, my Dears, I know not, but if they never beheld any other Figures of their own Species than themſelves, they would think themſelves as handſome as you do one another. But I was going to tell you, that, were the Pupils of the Eyes of the Inhabitants of Mercury, ſeven Times as ſmall as ours, their Light would be no ſtronger to them than ours is to us; and is not this eaſy for the Almighty to do?

Certainly,

Certainly, but I think their Eyes would be as small as Pigs Eyes; however, if none else were there of our Symmetry and Proportion it might be thought very well of—at any Rate, such a Size seems necessary. How good is God, in placing us here!

Q. I wish to know some Degree of the Sun's Light there?

A. The Light of the Sun is 100 Times greater at Saturn, than the brightest Moon-Light is here.

Q. How long are the Days and Nights of Saturn?

A. The Sun shines 15 Years on one Side of his Ring, and 15 on the other; so that their Day is 15 Years long of our Account, and so is their Night.

Q. What do you mean by his Ring?

A. A large Body of Earth (probably) 800 Miles in Thickness and 21,000 Miles distant from his Body and 21,000 Miles broad; is placed in a circular Arch round about him; this, with the Moons which attend him, is the most grand Phenomenon amongst all the Planets, and is truly a most wonderful Sight through a good Glass*.

Q. How

* Dr Herschel has just discovered, that Saturn has two Rings, separated by an Interval of 996 Leagues; through which, he has clearly perceived the Sky. He has measured the outer Diameter of the Ring, and found it to be 80,710 Leagues. He has also found, that the Satellite of Saturn, turns on its Axis in 79 Days, 7 Hours, and 47 Minutes, which is the Term of its Revolution; so that it always presents the same Face to the Planet.

M. De La Land observes, that if there be no Mistake, in the Figure above mentioned, the Diameter of the Ring is greater by ten Seconds, than has hitherto been observed; which is a most extraordinary Difference indeed.

Q. How many Moons has he?

A. Seven, The 1st, goes round him in 1 Day, 21 Hours, and 19 Minutes.

The 2nd, in 2 Days 17 Hours and 40 Minutes.

The 3d, in 4 Days 12 Hours and a half.

The 4th, in 15 Days 22 Hours and 41 Minutes.

The 5th, in 79 Days, 7 Hours, and 40 Minutes: is one Million 800,000, Miles distant from his Body; the Rest in a smaller Proportion,

The 6th Moon moves round in 32 Hours, 48 Minutes and 12 Seconds.

The 7th, moves round in a little less than 24 Hours. This last Satellite is nearer the Body of Saturn than any of the rest.

OF THE GEORGIUM SIDUS.

Q. Which is the next Planet which moves round the Sun?

A. The Georgium Sidus, which he performs in 83 Years and 130 Days; his Diameter is 35,865 Miles; and moves at the Rate of 15,650 Miles an Hour. It appears always in our Hemisphere in Winter.

Q. By whom was the Georgium Sidus discovered?

A. By Dr. Herschell; its Distance from the Sun, is 19 Times greater than the Earth, i.e. 1,815,912,260 Miles: its Light is of a bluish White Colour, and its Brilliancy between that of Venus and the Moon. It has two Moons, one at Full every 8th, and the other, every 14th Day.

Q. Which of the Planets has the largest Orbit?

A. The

A. The Georgium Sidus, as 'tis thought it includes all the other Planets in its Circle.

Surely, Papa, the Inhabitants of the Georgian Sidus must be Giants, and their Eyes 10 or 12 Yards in Diameter, to receive in a sufficiency of Light, to render it but like our Twilight, in that remote Region.

It is true, it is a very remote Region, but the Almighty knows how to supply all their Necessities, it is already discovered that they have two Moons to supply them with Light, and they may have many more, which fourteen Years Time may discover; as during that Time, it will be approaching nearer us*.

Q. Has

* From Dr. Herschell's Papers in the Philosophical Transactions of the Royal Society of London, 1788, on the Georgian Planet, and its Satelites, the Result of the Doctor's Observations and Calculations are, The Period of the first Satelite 8 Days 17 Hours 1' 19". Its Distance 33" and on the 19th of October 1787 at 19 Hours 11' 18" Its Motion was $76^{\circ} 43'$ North following the Planet. The Period of the 2d Satelite 11 Days 11 Hours 5' 1" 5. Its Distance 44 23; and on the 19th of October 1787, at 17 Hours 12' 40" was $76^{\circ} 43'$ North following the Planet. The Orbit is inclined to the Ecliptic $91^{\circ} 13' 1$ or $89^{\circ} 48' 2, 1' 5$ its ascending made in 18° Virgo, or 68 Sagittarius.

The Situation of the Orbit of the First differs not materially from the Second. There will be Eclipses of these Satelites about the Year 1799, or 1818, when they will appear to ascend through the Shadow in a Direction almost perpendicular to the Ecliptic. The Diameter of the new Planet, is to the Diameter of the Earth, as 4,31769,1; its Bulk 80,49256,1; Its Density 0,20401,1; Its Quantity of Matter 17,740612,1; and heavy Bodies fall on its Surface 15 Feet 3n Inches in a Second.

Q. Has it ever been discovered whether Mercury, Saturn, and the Georgium Sidus have any Motion round her Axis?

A. The Former is too nigh, and the two Latter too remote from the Sun to make it certain, whether they do or no, although it is generally believed they do.

Q. Is the Moon and other Planets well accommodated for Inhabitants?

A. It is thought they are, with Lands, Seas, and Rivers, with Rocks, Hills, and Islands; and if so, no Doubt but they are also replenished with Herbage, and also with Inhabitants, and every Star also.

Q. What do you mean by the Orbits of the Planets?

A. Those large Tracts, or Rings, described by the Centers of their Bodies in their Progress round the Sun, which are rather Ovals, than Circles.

Q. What am I to understand by the Plane of an Orbit?

A. It is a flat Surface extended through the Orbit infinitely.

Q. Are the Orbits of the Planets all on the same Plane?

A. No; they are all variously inclined: The Plane of the Earth's Orbit, is called the Plane of the Ecliptic; this is the Standard to which the Planes of all the other Orbits are judged to incline.

Papa, I wish I could see all the Planets in their Orbits, what a fine Sight it would be!—could you show us something to represent them?

Yes,

Yes, S——I, you may easily conceive them, by supposing the Plan of the Eclipse to be the Surface of a round Table, and the Orbits of the Planets, so many Hoops—Bring me your Hoops, and I will show you.—This one, call Mercury; the next smallest, Venus; the next, our Earth; which must include these both in the Sphere of her Orbit; you must borrow other four Hoops, for the other four Planets:—now these seven Hoops you see, intersects the Table (call it the Ecliptic) in such a Manner, as to have one Half above, and one Half below it. The two Points of Intersection, are called the Nodes; the right Line passing through the Sun, the common Intersection of the Planes of the Orbits of any Planet, and the Ecliptic is called the Line of the Nodes of that Planet: For instance, the Orbit of Mercury makes an Angle with the Ecliptic of almost 7 Degrees, Venus above 3 Degrees, Mars nearly 2 Degrees, Jupiter $1\frac{1}{3}$ Degrees, Saturn $2\frac{1}{2}$ Degrees, Georgium Sidus 46 Minutes and 12 Seconds.

Now, Sister Eliz--th, could we see them all in Motion, there would be a grand Sight.—Could you represent that to us any way, Papa, or can that be done?

No, Eliz—th, I cannot, but it is to be done upon a Machine made on Purpose, called the Orrery, there you have the whole heavenly Bodies in their respective Motions; and had I been at Home, last Month, when the Philosophical Lectures were delivered here, you should have seen them.

Papa, we have heard many Persons talking of Changes in the Weather, of Wind and Rain, &c. caused

C

by

by the Age, Change and Full of the Moon; the Aspects and Conjunctions of the Planets; but they are generally counted old Wives Fables and Sailors Observations; and however, they may hold true at Sea, they seldom do so on Land. But if you know any certain Rule, by which those Changes may be known, we shall be glad to be acquainted with them; for such Knowledge would be of great Use in many Respects.

But, my Dear, if you were instructed in them, you would speak of them to others, and then you would be accounted as an Old Woman too; beside, you seem to doubt whether any such Knowledge is attainable; and if so, it is only wasting Time to endeavour to acquire the Knowledge of what we think has no Existence.

Papa, we do not say it is impossible, for I do believe there is something in it, from the few Observations which I have made, in the New Almanack called the Planetary, and which you say is the best ever published: I am sure it is the truest, respecting the Weather, of any we have ever tried. And also from the Rev. Mr Malum's---Monthly Observations on the Weather, in the County Magazine; but it appears to me very mysterious how it should be known.

Now, my Dears, if you will promise me to lay aside your Hoops and Dolls for a Month or two, and employ your Play Hours with me for that Time, I think I can help you to the Knowledge of this Matter.---Are you all willing, for none else shall be admitted to our little Lectures, on this Branch of Knowledge, but such as are very desirous?

Yes,

Yes, Papa, there is not one dissenting Voice. —

Then we shall meet To-morrow Morning, at Six o'Clock, for one Hour.

I shall begin with the first Planet, the Sun, when he is in Conjunction with Mercury, without the Mixture of any other Planet (that is, their receding or advancing within a certain Degree of either of the above Planets,) will procure fine Weather.

The Sun, with Venus, without Mixture, is showery Summer, and snowy in Winter.

The Sun with Mars, brings Heat and Lightning, without Rain.

The Sun with Jupiter, produces clear frosty Weather in Winter, and the same with Saturn.

The Sun without Mixture or Conjunction, brings in Spring, slow dropping warm Showers---in Summer, Drought---in Autumn, Mists---in Winter, small Rains.

The Sun in Conjunction often produces Wind from an easterly Point.

The Conjunction of the Sun with the Moon, lasts 5 Hours, the Sun with Mercury, Jupiter or Saturn, 3 Days, with Mars, 8 Days, and Venus, 9 Days.

The Sun's Influence is observable 15 Degrees, before and after the Instant of the Conjunctions.

When the Moon approaches to the Earth, she hath of course, the most sensible Influence over it; and when she is in Conjunction with Mercury, produces Wind.

And with Venus, Showers.

With Mars, Red Clouds, with Rain.

With Jupiter, a serene Sky.

With Saturn, cold Air.

The Moon's Influence extends 12 Degrees before and after her Conjunction with any Planet.

The new Moon Week, without any Mixture, the Weather is mostly Cold, Calm or Dry; but on the Contrary, during the full Moon Week, you will find it Warm, Windy or Wet, but it must be observed, that whatever Variation there shall be found, it will be occasioned by the Influence of Approach or Recess of the nearest Planet to her; which will increase or counteract her natural Tendency, and of this, a little Observation will make you able to account for these Changes yourselves.

Observe also, that in Spring and Autumn, i. e. March, April, May, and in September, October and November, you will find the Weather generally change on the Day of each new and full Moon; but in the Summer Quarter, i. e. June, July and August, the Weather will change after the Day of the new and full Moon: And in the Winter Quarter, i. e. December, January and February, the Change will take Place before the Day of the new and full Moon.

When Mercury is with the Sun, without Mixture the Weather will be pleasant and clear.

Mercury, with Jupiter, brings wet and rainy Weather.

Mercury, in Conjunction, brings Storms from a southerly Point, also rains with Intervals of Sunshine.

Mercury's Influence, extends to 7 Degrees before and after the Moment of Conjunction with any Planet.

The

The Conjunctions of Jupiter, combined with Saturn, Comets and great Eclipses, especially that of the Sun, works great Alteration in the Atmosphere.

When there are no Aspects, or only those of Jupiter or Saturn, the Seasons are mostly quiet; but where many Aspects happen, one immediately after another, there will be a very lowering Sky, although there is neither Wind nor Rain.

Venus, with the Sun or Mars without Mixture, brings Showers in Summer and Snow in Winter.

Venus, with Mercury, brings Showers and Sunshine.

Venus, with Jupiter without Mixture, brings clear and pleasant Weather.

Venus, with Saturn without Mixture, in Winter, brings cold Rain, Snow or Hail, also very close dark Weather.

Venus, with Saturn, in Summer, brings Rain and Hail.

Venus, in Conjunction, is generally accompanied with a cool Wind, from a westerly Point.

The Influence of Venus extends to 7 Degrees before and after the Moment of Conjunction with any Planet.

Mars, in Conjunction with the Sun or Mixture, produces Meteors, also Thunder and Lightning without Rain; also misty Weather, with sudden Changes from East to a West Wind.

Mars, in Conjunction with Venus, is frequently showery in Summer and snowy in Winter; and especially if either of them have made a recent Visit towards Saturn.

Mars, with Saturn, in Winter, brings cold and frosty Weather.

Mars, with Jupiter, in Winter, brings cold and boisterous Weather.

Mars, with either Saturn or Jupiter, in Summer, brings variable and tempestuous Weather, with Lightning.

The Conjunction of Mars, with either Jupiter or Saturn, continues 9 Days.

The Influence of Mars extends to 7 Degrees, before and after the Moment of his Conjunction with any Planet.

The Aspects of Jupiter and the Sun, in Winter, without the Mixture of any other Planet, brings clear and frosty Weather, especially if the Sun should separate from any Aspect of Saturn.

The Conjunction of Jupiter and Mercury, brings wet and rainy Weather.

If Mercury separates from Jupiter, it generally brings warm and windy Weather.

The Aspects of Jupiter and Venus, without Mixture, brings clear and pleasant Weather at any Season.

Any Planet proceeding from the Aspect of Jupiter, to the Aspect of Venus or Saturn, makes it very cold in Winter, and cold for the Season, in Summer.

Jupiter, in Conjunction, is generally accompanied with a West Wind.

Whatever the Point be, from whence the Wind blows, during the Conjunction of Jupiter and any other Planet except Saturn, the Weather is pleasant and healthful; for his genial Beams moderates all the rough Harshness of all Weather which just preceded.

Jupiter

Jupiter's Conjunction with Saturn, continues 24 Days, and Jupiter with Mars, continues 9 Days. Jupiter influenced is discernable 9 Degrees before and after the Moment of Conjunction.

The Conjunction of Saturn, with the Sun, or Mars, or Jupiter, in Winter without, Mixture, brings clear frosty Weather.

Saturn, with Venus, without Mixture, in Winter, brings cold Rain, Snow, or Hail; also very dark, close Weather, and in Summer, Hail.

The general Aspects of Saturn combined with any Planet, without Mixture, brings very cold Weather in Winter, though not always frosty, and in Summer the Weather is cold for the Season.

Saturn, in Conjunction, brings Wind, from either the North or East.

Saturn's Influence is extended 9 Degrees before and after his Conjunction with any Planet.

Now, Children, with but a little Attention to these Observations, you will acquire all the supposed unaccountable Mystery; only you must not do as too many do, only attend to this for a Month or two, and when any Thing new falls in your Way, throw this aside, and pursue that until somewhat again eclipses that, and so on.—Such Person will never excel in any Thing.

We wish to pay Attention to this, Papa, but must trouble you often to assist us before we can acquire much Knowledge in it—Pray is there any certain Rule to know whether the Winter will be severe or no?

You will by Observation find, that a cold rainy Summer, will almost infallibly produce a cold snowy Winter and Spring.

Is there any Rule to know whether the Winter will be open?

On the 21st. of December, when the Sun enters into Capricorn; mark, and if the Moon or any other Planet go immediately from Saturn to Jupiter, the Winter will be mild and open. But if they go from Jupiter to Saturn, it will prove a frosty and snowy Winter.

Can it be known when there will be a Conjunction between the Moon and any Planet, by beholding them?

Yes, the Evening before the Conjunction, you may behold such a Planet shining near the Moon; if the Moon is visible, it will appear clearer than any other Star and much larger—it is the first visible after Sun set, and does not twinkle, but gives a steady Light.

Well, we are determined to mark this, but how shall we know the Name of such a Planet, as shall thus enter in Conjunction with the Moon;—also the Planets one with another, or any of them with the Sun; for we perceive this Rule extends only to the Moon, and even that only, when she is visible?

As you are not likely to be professed Astronomers, nor to have a Globe by you; let me advise you always to purchase the Almanack and Planetary, there you have the whole of the Planets in their Positions, Aspects and Conjunctions, for the whole Year; so that you have only to look for them in the Heavens at their Times.

OF

OF COMETS.

Q. What are Comets ?

A. A kind of Planets, which revolve round the Sun in elliptical Orbits*, whose periodical Times and Motions are constant, certain and regular.

Q. What sort of Substance are they ?

A. They must be inconceivably hard, as the Heat of that Comet in 1680 was 200,000 Times hotter than red hot Iron§, and it must retain (if not increase) that Degree of Heat, during its vast Revolution of 557 Years, and still it remains unconsumed and unimpaired.

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Q. At

* What Wisdom in God is discovered, in placing all the Orbs at such suitable Distances from each other ; so as not in the least Degree to interfere with each other, especially the Sun, that vast Body of Fire ; the Sun's Situation does not annoy, but only refresh us, and nourish the Ground with its kindly Warmth. If it were larger, it would set the Earth on Fire ; if smaller, it would be frozen ; If it was nigher to us, we should be scorched to Death ; if farther from us, we could not live for want of Heat. Stackhouse's History of the Bible. It is highly probable, that the Inhabitants of all these celestial Worlds, may have equal Cause with us to admire the Wisdom of God in so disposing these various Bodies which move round them.

§ Supposing a Ball of Iron, as large as the Earth, heated red hot, by that Comet it would hardly become cool in 50,000 Years. Sir Isaac Newton's Principia, p. 166.

Q. At what Distance was that Comet from the Sun?

A. Its greatest Distance was 11000,200 Million Miles, moving its Orbit at the Rate of 800,000 Miles an Hour; it was then 166 Times nearer the Sun than the Earth is, and its Heat was 28,000 Times greater than our Summer;—it was then nearer to the Sun, than any fixed Star; and 6 Times farther from the Georgium Sidus than it was from the Sun.*

Q. What an amazing Transition from extreme Heat to extreme Cold, must that Planet undergo?

A. Its Light and Heat varies so much, as to be 400 Million Times greater at one Time than another; see a Letter of the late Rev. Moses Brown, Vicar of Olney, Buckst.

Well,

* Some of the Comets go almost 14 Times as far from the Sun as Saturn is, and yet they are nearer to the Sun than to any of the Stars; for if any Comet should go as near to any of the Stars, when farthest from him, it would be as much attracted by that Star, as it is then by the Sun; and its Motion being then towards that Star, it would go on and become a Comet to that Star.

† EXTRACT OF A LETTER,

September 11, 1769.

This Comet continues its former Course through the Heavens, at the Rate of about 5 Degrees and a Quarter, per Day: Yesterday Morning, before the beginning of Twilight.

Well, Papa, this is all Matter of Wonder and Amazement;—of what Texture must the inhabitants be, suppose there be any it? No Mortal can solve your Query, but, although Creatures of our Texture are not calculated to exist in such Worlds, God has appropriated us and our World the one for the other; and he also can form Creatures proper for those other Worlds which he has created.

Q. Are their Tails of the same Substance with themselves?

A. No, they are only Vapours, for the smallest Star may be seen through them, which could not be, were it either a Substance or Fire; and they always issue out from that Side towards the Sun.

Q. How many Comets are there?

A. By the best Accounts Twenty-one, but the Periods of Three only are known.

Q. Which are they?

A. The first is that which appeared in 1661, and is thought will appear again this or next Year †—

the light, it was observed to be a little South of the Equator; and its Tail more than 42 Degrees, stretching through the Girdle of Orion. At this Time, the Distance of the Comet from the Sun is 57,000000 Miles, and from our Earth 50,000000 Miles, and distant from its Perihelion 70,000000 Miles, the Length of its whole Tail is 3,000000 Miles. It moves now per Day 4,500000 Miles, and will move in its Perihelion 8,000000 Miles per Day, and its Perihelion will be 35 Times as hot as the Heat of the Sun at the Equinoctial Line on our Earth.

Moses Brown.

† This was wrote in the Year 1791.

the Period of which will be 130 Years* ; the second was that in 1680, its Period is 557 Years; the third was in 1759, its Period is 75 Years.

Q. How often have Comets been seen, and how long since the first was seen?

A. The first ever seen was, A. M. 1756, the Year before Noah's Flood; i. e. before Christ 2292; It was seen 24 Days following, and since that Time to the Present, there has been 418, by the very best Accounts I can procure; but the Records of those Times are very imperfect, so that there is no Certainty, at least for the first 2000 Years of the World.

Q. Do

*Query whether the dreadful Tempests and Inundations, which were so uncommon and so generally felt from last November 1790, to the end of January, 1791, were not affected by the Approach of that Planet to our Earth, although not discerned by us:—I shall here give a short Account of that Comet with what followed.

It appeared in the Morning of February 3d, and continued to March 28th. It was below the Dolphin, near the Head of Aquila. Its Distance from the Earth was at first 2000 and at last 9000 S. T. so that it was higher than the Sun, its Motion direct from East to West. The Telescope discovered a Star in the Body of the Comet, about which a more thin and dilute Matter might be discovered. February 5th, that Star was divided into several Parts. February 6th. it was dissipated into several little Stars, one of them was more dense and shining than the rest; the Blaze was obscure, and about 7 Degrees in Longitude, and afterwards at Times it was 20D. of Longitude, of a conical Form. The Events were,

1. The

Q. Do Comets ever cause any Eclipses?

A. Some Persons think that the Eclipse at Christ's Crucifixion, was occasioned by a Planet's coming between the Earth and the Sun.

Q. Have Comets any Effect upon the Earth?

A. The Astronomers of the present Age, think not: Until this Century it was always believed that the Almighty (who constantly Works by Means to bring about his grand Designs) made use of them as second Causes to effect great and terrible Events; but our enlightened and improving Age, both in Science and Religion, have quite exploded that Sentiment; I have minutely examined the above Number of Comets 418. by all the Authors who lived in their respective Times, that I have read, and find them all attended with affecting Events, and 28 of

1. The Turks fell upon Germany (where especially this Comet was observed) making woeful Havock there.

2. That Black Bartholomew's-day, which the Non-conformists in England, so justly complain of, happened but half a Year after this Comet; a Scene the like is not to be paralleled in any History, that 2000 Ministers should be silenced in one Day. It is also to be observed that in this Nebula which was cast down, were many Stars of the first Magnitude; and therefore a Comet might well precede an Event of such a remarkable Nature.

3. The Tartars Excursions into Asia, Hungary, Moravia and Silesia, sacking and burning many Towers, and making no less than 160,000 Souls Captives, whom they sold to their barbarous Brethren the Turks.

of them with most dreadful Droughts, even to Famines. Homer was of this Opinion—

As the red Comet from Saturnius sent,
To fright the Nations with a dire Portent;
A fatal Sign to Armies on the Plain,
Or trembling Sailors on the watry Main,
With sweeping Glories gliding thro' the Air,
And shakes the Sparkles from his blazing Hair*.

Papa, Scripture tells us, that this Earth shall be dissolved by Fire, I have been thinking by what Means God will set it on Fire: Suppose he was to suspend the Power of Gravity in one of the Comets, and double the Power of Attraction in the same Moment to that Body next to him at that very Time, suppose our Earth; this I think would set our World on Fire, and effect the general Conflagration.—Pray, was there ever any such Idea or Opinion as this entertained?

Yes, S—l, some Astronomers have formed such an Opinion. That Comet in 1680, which was the most

* I must acknowledge myself to be of this old-fashioned Sentiment; but my Knowledge and Experience of the Point is too insignificant to be mentioned.—To the same Purpose says Silvester in his Translation of Dubertus, P. 14.

There, with long bloody Hair a blazing Star,
Threatens the World with Famine, Plague and War,
To Princes Death, to Kingdoms many Crosses;
To all Estates, inevitable Losses;
To Herdsmen Rot, to Plowmen dreadful Seasons;
To Sailors Storms, to Cities civil Treasons.

most fearful ever known; one Part of its Orbit then appeared very near the Orbit of our Earth; and at that Time the Earth was out of its Way; but whether this may always be the Case, or whether it may in some future Revolution approach near enough to have some fatal Effects on the Earth, by the Power of Attraction, is a Matter partly undecided; and against which the great NEWTON himself durst not hazard an Opinion.

Q. Do any of the Planets give us Light?

A. All of them reflect Light to us; but especially Jupiter and Venus, which are good Supplies to us in the Moon's Absence.

Q. Whether does the Comets or the Planets make most Way in their Motion?

A. The Comet in 1618, in three Months Time, dispatched 180 Degrees; no Planet ever passed over the Arch of such a Circle, in so small a Time.

Q. Do all Comets move at the same Rate?

A. No, some have moved 30 some 40 Degrees in one Day; whereas no Planet moves above 2 Degrees a Day.

Q. I think that the Comets must move round the Sun in much longer Orbits than our Planets—do they not?

A. The Orbit of Saturn is 4884 Million of Miles, but some of our Comets make Excursions of 10000 Million of Miles beyond Saturn's Orbit! Yet, at that

that amazing Distance, they are nearer to the Sun by many 10000 Million of Million of Miles than the nearest fixed Star!

Q. What is the Use of Comets?

A. To be Fuel for the Sun, that in 1620, being retarded in every Revolution by the Atmosphere of the Sun, within which it enters more and more every Time, and so must continue to do, until at last it will fall into his Body. — This is one Use of Comets, to be Fuel for the Sun, which otherwise would be in Danger of wasting, from the continual Emission of Light.

Q. Are Comets absolutely necessary then?

A. Comets seem absolutely necessary for the Conservation and Moisture of the Planets; as from them, all those condensed Vapours and Exhalations, all the Moisture which is spent in Vegetation and Putrefaction, and turned into dry Earth, are supplied and recruited; for all Vegetables grow and increase wholly from Fluids, and the greatest Part of them turn again by Putrefaction into Earth, whence the Quantity of dry Earth must continually increase, and the Moisture of the Globe decrease, and be quite evaporated, if it had not a continued Supply from some Part of the Universe. For the Spirit which make the finest, subtlest and best Part of our Air, and which is absolutely necessary to the Life and Being of all Things, comes from Comets.

Q. What

Q. What was the moral Cause of the Flood?

A. Newton, Whiston and Flamsteed, think the universal Deluge in Noah's Time, was occasioned by the too near Approach of that great Comet to the Earth. They think that the Earth passing through the Atmosphere of the Comet, attracted therefrom great Part of the Fluid; that the Nearness of the Comet raised a great Tide in the subterraneous Waters, so that the outer Crest of the Earth was changed from a spherical to an oval Figure, that this could not be done without making Fissures and Cracks in it, through which the Waters forced themselves by the hollow of the Earth being changed into a less capacious Form; that along with the Water, thus squeezed upon the Surface of the Earth, much Slime or Mud would rise, which together with the gross Part of the Comet's Atmosphere, would after the subsiding of the Water, partly into the Fissures, and partly into the lower Parts of the Earth form a Sea, and cover all over the Antideluvian Earth a considerable Depth. The same Comet will probably, when coming too near the Earth, and heated to an immense Degree in its Perihelion, be the instrumental Cause of the Conflagration foretold in Scripture.

Q. How much further was that Comet in 1680, in its Aphelion from the Sun than Saturn?

A. Upward of 14 Times the Distance of Saturn.
Papa,

Papa, only look at Mr. F ———'s House, you can hardly see one Tile of it, there are so many Swallows upon it, they come and go frequently in a few Hours.

My Dear, they are preparing for a long Journey—they are going to leave us for a warmer Country, to which they will soon fly, over Seas, Tracts, Deserts and Kingdoms, without a Guide, and in a little Time.

Papa, how long do you think they would take to fly to the Comets or Stars?

I do not know, my Dear, but we will suppose ourselves at the Sun, and these Birds taking their Flight; suppose them to fly at the Rate of 240 Miles an Hour, they would reach

Mercury in 17 Years, 187 Days,

Venus in 39 Years, 78 Days,

The Earth in 68 Years, 330 Days,

Jupiter in 234 Years, 100 Days,

Saturn in 431 Years, 207 Days, and

The Georgium Sidus in 860 Years, 260 Days.

Papa, I am lost in Astonishment, and I have lost all Ideas of the Infinitude of that vast Space, so wonderfully filled with such glorious Bodies, and so governed as they are.

Of the STARS.

Q. What are the Stars?

A. Suns, and they give Light and Heat and Vegetation to a certain Number of inhabited Planets, kept by Gravitation within the Sphere of its Gravity, as our Sun does in his System.

Q. How

Q. How many Stars are there?

A. In a clear Winter Night, without Moon-shine, we may behold in our Horizon about 1000.

Q. How are they arranged?

A. In Constellations, with particular Names to each of them, and by the Help of a Globe you may discover them in the Heavens.

Q. At what Distance are they from us?

A. Those that appear with the greatest Lustre, are called Stars of the first Magnitude; the next in Lustre, Stars of the second, and so on to the sixth, which are the smallest that can be discerned by the naked Eye.

Q. What is the Distance of the farthest Star from us?

A. No one can tell.

Q. Do the Stars keep their regular Time of Appearance every Night?

A. If you will please to mark any Star, when it is directly over the Church Spire, then look what o'Clock it is, and next Night at exactly four Minutes before that Hour, you will discern the same Star over the Spire, and the next Night eight Minutes after the Hour, and so on.

Q. How far is the nearest Star from us?

A. Sirius, the nearest Star to us is 2,200,000,000,000 viz. 2 Billion, 200,000 Million of Miles, so that if a Cannon was discharged towards the Sky, from this Town, it would not reach Sirius in 700,000 Years,

Years, although it went at the Rate of 480 Miles an Hour.

Papa, I was thinking how long it would take the fallen Angels, in their Fall, to reach our Earth?

M——, we can have no proper Idea of the Motion of Spirits.

That's true, Papa, but suppose I indulge the Thought a Moment, allowing them to fall from Heaven, with the same Force that Bodies of the Human size and weight would do, through Air, I think they would not have reached our Earth or Atmosphere, from the Creation until now.

M——, this is speculation?

Why, Papa, if there are some Stars the Light of which have not reached to us since the Creation, although it moves at the Rate of 191225 Miles in a second of Time; from this, I think they have never reached our Earth to this Day.

Q. Is it possible for us to see the whole of the Stars, with the Assistance of good Glasses?

A. Utterly impossible! as Millions of Millions of them never have, nor never can be observed by us, by Reason of their remote Distance.*

Q. How

• O Immensity! O Eternity! who can measure the Lines, or fathom thy vast Abyss? and still, "Not yon Luminaries quenched at once, were half so sad as one benighted Soul, which grasps for Happiness and meets Despair."

Q. How large are the fixed Stars?

A. Nearly of the same Magnitude of the Sun.

Q. How many fixed Stars are known from the Planets?

A. Fixed Stars always keep the same regular Place and Distance from each other; but the Planets are always changing. The fixed Stars twinkle; but the Planets are calm like the Moon.

Q. How many fixed Stars are known at this Time*?

A. Hippaochus, enumerated 1026—Dr. Herschell has enumerated 44000, and by Analogy there appears to be 75 Millions.

Q. What makes fixed Stars twinkle?

A. It is occasioned by the vast Number of small Bodies, which always are floating in the Air, and daily are passing over them; but the Planets being nearer to us, and their Light being more bright, are not affected by them.

Q. What would the Sun appear to be, to an Inhabitant of a Star?

A. A fixed Star.

Q. What

* See yonder Planets in their Orbits rise,
See Stars (those Worlds) do infinite arise,
Here restless Meteors, their long Vigils keep,
While roving Comets in their Orbits sleep;
Or left at large—Velocity immense,
Elyptic fly, and range the vast Expanse,
Here Polar Suns, as Polar Stars appear,
And Optic Art pervades each Hemisphere.

Q. What Region is beyond the Georgium Sidus?

A. The milky Way, that vast Expanse, the Region of the Stars.

Q. What is its Extent?

A. No Mortal has explored or can explain it to us, it appears a grand Emblem of its great Maker's Infinity

Q. How many Constellations are there?

A. Eighty, 12 in the Zodiac, 36 in the Northern Hemisphere, and 32 in the Southern Hemisphere.

Q. Have Stars ever been known to remove, or totally to disappear?

A. Yes, in the Year 1572, in November, a Star appeared in the Constellation of Cassiopeia equal to Jupiter, both in Bigness and Magnitude; but after gradual decreasing in February 1754, it entirely disappeared.

Q. What is meant by Nebula Stars?

A. Innumerable Collections of innumerable Stars, each of which is superior in Light and Magnitude to our Sun?

Q. Are those Nebulas clustered one on, or close to another?

A. Our remote Distance makes us think so, but they can be no nearer to one another than we are to Sirius, whose Distance from us is 400000 Times more than the Sun is from us, or 38 Million of Million of Miles, and the whole Extent of the Ne-

bula

bula is 500 Times as great : suppose a Star placed at the extreme Boundary, supposing its Light to fly at the Rate of 12 Million of Miles every Minute, it will take 3000 Years to reach us. Our Nebula is by far the smallest, so much so, that the Light of some of the remotest Stars, of the largest and remotest Nebula, will possibly not arrive at our Earth, before the Sound of the last Trumpet.

Q. What sort of Stars are they which fall to the Ground?

A. There is no such Thing in Reality, as falling Stars: what is vulgarly taken for them, is no more than a fiery Meteor kindled in the Air, by the Mixture of inflammable Substances; they move rapidly while they dissipate themselves and become extinct.

Q. What is the Cause of Lightning?

A. The above Meteor, when falling, meets with a Stream of other Matter, and sets Fire to it as it rolls along, it is then called Lightning.

Q. What is the Thunder-bolt caused by?

A. When the above Stream of Inflammable Matter darts down like a Torrent of Fire, this is termed a Thunder-bolt, the Effects of it, are more or less dreadful as the Quantity or Malignity of the Ingredients are of which it is composed, as also the acting of the Wind upon it.

Q. What is the Cause of Thunder?

A. By the breaking forth of the above fiery Streams, the Air is rarified to a very high Degree, and

and meeting with other Quantities of confined Air between the Clouds, can exert its elastic Force no other Way than by bursting through them with a terrible Force causing an Explosion, which awful Crack we call Thunder*.

Q. Is it because the Sun is farther from us in Winter than he is in Summer, that our Days are shorter, and Weather colder?

A. The Sun is 190000 Millions of Miles nearer to us in the Winter than the Summer; were it not so, we should be cold indeed.

Q. What then is the Cause of our short Days, and cold Weather?

A. The first Cause is, the Sun is but a very short Time in our Horizon, which diminishes the Heat, as his Absence lengthens the Night.

Q. What is the second Reason?

A. 'Tis the oblique Direction of the Sun Rays, which are then very weak, and has but little Force on the Earth; hence it is that we have cold Weather in Winter.

Q. What is the Cause of our long Days and warm Weather in Summer?

A. The Sun's longer Continuance in our Horizon, which increaseth our Heat as it lengthens our Days.

* Altho' this violent Crack is but one single Act, yet there seems to be a Repetition of it lasting for some Time; but this is only the Sound reflected from the Surface of several Clouds, repeated by many Echoes.

Days,—And also the perpendicular Rays of the Sun, which are much stronger than the Oblique, and being of longer Continuance, heats the Earth; hence is our warm Weather.

Q. What are those Streamers, called Northern Lights?

A. It is judged there is at the North Pole a Volcano of a League Diameter, which emits at Times, vast Quantities of prismatic Particles of crystalized Nitre, which rising to a great Height, and from the thick Clouds above, and the crystal Mountains of ancient Snow, sends forth its Beams with tremulous Vehemence through the Air, in southern Directions; which we call the Northern Lights*.

ON THE NORTH POLAR STAR.

FIX'D is thy Orb, perhaps thou art a Sun,
And Millions bask beneath thy chearful Ray;
Perhaps a System rolls around thy Sphere,
And gains from thee, the precious Gift of Day.
Still true to Thee, the faithful Magnet stands,
While wandering Planets in their Orbits roll;
And bright, like thee, some southern Glory shines,
And points its Radiance to th' Antartic Pole.
Earth must adore, when she beholds thy Ray,
Wrapp'd, sparkling wide, in Light's resplendent Robe;
The Naval World is thine, and led by thee,
Man's daring Sail, surrounds the liquid Globe,
Still may some Cook each unknown Coast explore,
And bear Life's Gifts to every barb'rous Shore.

D

Q. What

* See Captain Wyatt's Account of what he saw when near the Pole on the 23th. of May, 1786.

Q. What causes the Rainbow?

A. The refraction of the Sun's Rays in Drops of falling Rain; when the Cloud is right opposite to him, it causes that glorious Appearance, that promised Sign of God's merciful Favour to Mankind, and which you should never forget.

B—n. Well Papa, we are much, *very* much obliged to you for this Information—I would not have been without it on any Account; I assure you I dream'd of it last Night, and so M—a, and B—sy, say they have too; and were quite transported with what they thought they saw.

M—va. I *do* think I never had such Conceptions of God and his wondrous Works before.

S—y. I think, Papa, that I would not part with the little Knowledge of this Science, nor be without the Pleasure arising from it, for all W—.

M—ha. I wish that all the Young Ladies of our School, did but see this Science in the Light that I do, I know they would be happy in the Use of it.

B—sy, I'm sure I would not exchange these enchanting Views of the celestial Worlds, for all the Labour of Dress, and Parties of Pleasure, in the World;—O! what abundance of rational Delight and Pleasure is to be obtained in contemplating the Works of God in Nature!

Papa, I wish we had Lessons upon Astronomy in our School, it would be a fine Recreation, and tend to future Usefulness; but when our Play is over, we have only Fatigue for our Labour;—Pray is there such Exercises in any School?

In many Schools, in play Hours, and in stead of the half Day's Play, the Boys are instructed sometimes in the Military Exercise, the Use of the celestial and terrestrial Globes, Electricity, with Lectures on Natural and Moral Philosophy, delivering Speeches, and many other Branches of useful Learning. For every Tutor who has the good of Youth at Heart, will spare no Pains; nor will the Parents of such Children let him be unrewarded.

But is there any such Thing at any *Ladies* Schools, as Amusements suitable to them?

Yes, at Mr — at N——n, and I knew several Young Ladies who could tell me every Kingdom in Europe, with the Nature of its Government, Trade and Religion; its Metropolis and principal Mountains, Rivers, Universities, Ports and Ruins.

What, Papa, were they taught all these formally in the School, as a Branch of Learning proposed by their Parents, and for which they were to pay?

No, my dear, these useful and uncommon Branches of Learning, amongst Young Ladies, were entirely saved or gained out of their Play-Hours; and the kind Attention of their Teachers, who truly deserved, and there is no doubt but were handsomely rewarded for their Pains, by the Childrens Relations.

M—va. Which is most to be admired, the Works of Nature or Providence?

I do not know, but I'm certain the Works of Redemption excel them all.

Q: How are the Clouds formed?

A. From

A. From watry Particles, exhale'd by the Sun from the Sea, Rivers and Lakes.

Q. How are Rain, Snow, Hail, Dew and Mist formed?

A. Of the same Vapours of which the Clouds are formed.

Q. What is the principal Agent in their different Formation?

A. Cold, in its different Degrees of Extremity, acting on these Vapours, in either the upper, middle, or lower Regions of the Air. But Rain especially in Summer, is generally caused by those fiery Vapours in the Air, above mentioned, which dilates and much agitates the Clouds and Air, and of course bursts into Showers.

Q. What is the Height of the Atmosphere?

A. It is not at all Times alike, but it is thought to be about 45 or 47 Miles in the Medium.

Q. How many Colours are there in Nature?

A. One single Ray of Light will show you that there are Seven, viz. Red, Orange, Yellow, Green, Blue, Indigo, and Violet.

Papa, I never saw any Colours in Light.

Then you shall B——n, here take this Prism—hold it up triangularly, and look through it—Oh!

Papa, we all look like Angels gloriously variegated; and the Study looks like Heaven; and here are all the seven Colours you mentioned. Look, Brother J—n.

Q. How quick is Light in its Motion?

A. It

A. It flies 191225 Miles in one Second of Time, and yet the Light of the remotest Stars, it is supposed, have not since the Creation of the World, reached our Earth as yet.

MY Dear Children, it gives me much Pleasure that my Labour has not been spent in vain upon you; I have indeed but shewn you little of the Science, I know but little myself; were you to have the Advantage and the Company of some sensible Men in this Science, you would soon teach your Father. However, remember, that Thousands and Thousands of Suns, multiplied without end, and ranged all around us, at immense Distances from us; attended by ten thousand Times ten thousand Worlds, all in rapid Motion; yet calm, regular, and harmonious, invariably performing the Paths prescribed to them—Worlds peopled by Myriads of intelligent Beings, ruled, exercised and provided for, blessed and made happy by our **LORD JEHOVAH**. O what infinite Wisdom! what superlative Goodness is most gloriously displayed in this stupendous Fabric of the Universe!—Think of this, Children, and a sanctified Use of it will make you both Wise and Happy; not vainly spending your precious Time in the Idle and prophane Amusements of the Age, but enjoying it, I mean your spare Hours, in the Researches of the Field of Nature; and then say with the Psalmist that "'Tis God who has laid the Foundation of the Earth, and that the Heavens are the Work of his Hand." But remember Religion only can teach you to say, "This God (that made and rules all these Worlds) is my GOD, and he will be my Guide until DEATH."

F I N I S.



OF THE DISTANCE, MAGNITUDE AND MOTION OF THE HEAVENLY BODIES. AT ONE VIEW.

Planets.	Distant from the Sun.	Motion round the Sun.	Motion round their Axis.	Motion in their Orbits.	Diameter of their Orbits.	Their own Diameter.
Mercury	36,000,000	0 87 23	Unknown.	109,699	66,621,000	3,100
Venus	68,000,000	0 224 17	24 8 0	801,295	124,487,114	9,360
Earth	95,173,000	1 0 0	0 24 0	68,243	190,000,000	7,970
Mars	123,000,000	1 321 17	0 24 40	55,287	262,282,910	5,150
Jupiter	424,000,000	12 0 0	0 9 56	38,159	895,134,000	94,100
Saturn	907,956,130	29 167 6	Unknown.	22,104	1641,526,386	77,990
Sidus Meon.	100,346,000	83 130 0	Unknown.	15,650		35,865
Sun	240,000 from the centre of the Earth:	1 0 0	29 12 45	2,290		480,000
	Is a Globe of Fire, its solid Contents is 29,097 1000, 000, 000, 000 Miles; and a Million of Times greater than the Earth.		25 6 0. i.e. 4262 Miles an Hour, and 40 times as fast as the Earth.			2,175
fixed Stars	Unknown.	25,920 Years, this is what is called the Platonic Year.	Unknown.	Unknown.	Unknown.	893,760

the fixed Stars

Unknown.

is what is called
the Platonic Year.

Unknown.

Unknown.

Unknown.

Unknown.